

Awareness of usage of fentanyl in dental applications among dental students

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ABSTRACT

Opioids like fentanyl are used both alone and in combination with other drugs to induce anesthesia and treat pain. It is also combined with heroin or cocaine when used recreationally. It starts acting quickly, and its effects usually wear off within 2 h. A typical pharmaceutical strategy for controlling the physical pain and psychological discomfort related to dental treatments, including surgery, is moderate (conscious) sedation. This study aimed to assess knowledge and awareness about dental applications of fentanyl among dental students. A 15-question survey was sent through an online platform to about 150 dental students in Tamil Nadu. Data were collected over a 6-month period and compared using SPSS software by IBM. The results were statistically analyzed and graphically interpreted. From the results obtained, we can observe that from the respondents of the current survey, 52% were undergraduates and 48% were postgraduate dental students. About 93% of them were aware of the fact that fentanyl comes under opioid analgesics, and 82% were aware that it is mostly used in case of pediatric patients. About 81% of the participants were aware that apart from benzodiazepines, fentanyl can also be used in combination with general anesthesia in dentistry. This study revealed that most of the participants are aware of the commonly used anesthesia and analgesia such as fentanyl in dental practices. However, more continuing dental education programs and seminars must be conducted to further enhance the knowledge and understanding of dental students about drugs such as fentanyl in dental practice.

Key words: Dental applications, dosage, fentanyl, innovation, prosthodontics, sedation

INTRODUCTION

Fentanyl is one of the robust pharmacologic agents, which is actually 50–100 times more potent than its other

counterparts. It has an analgesic and sedative property with a rapid onset of action. A small dose of even about 100 micrograms can produce an equivalent amount of analgesia that 10 mg of morphine can provide.^[1] Clinically, it is most commonly used in intubated patients as a sedative and in severe pain in renal failure patients owing to its property of hepatic elimination. Sometimes, fentanyl is also prescribed in cases of severe pain among patients who have developed opioid tolerance.^[2] As a sedative, the medication is usually administered by a drip. Finally, the application of fentanyl also includes the treatment of epilepsy. That is, as a part of therapeutic

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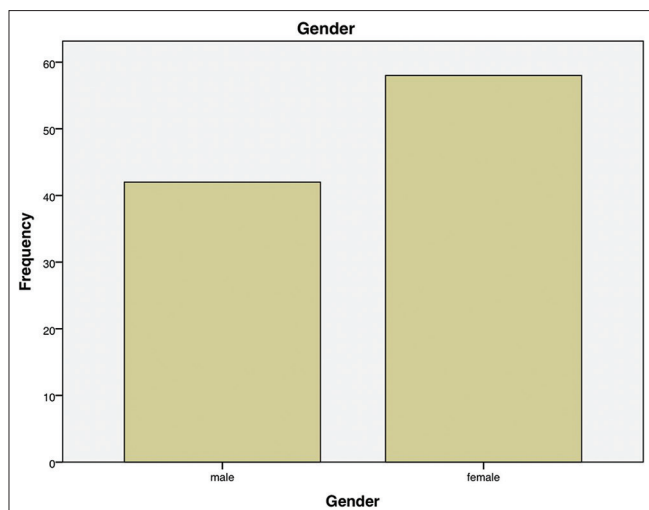
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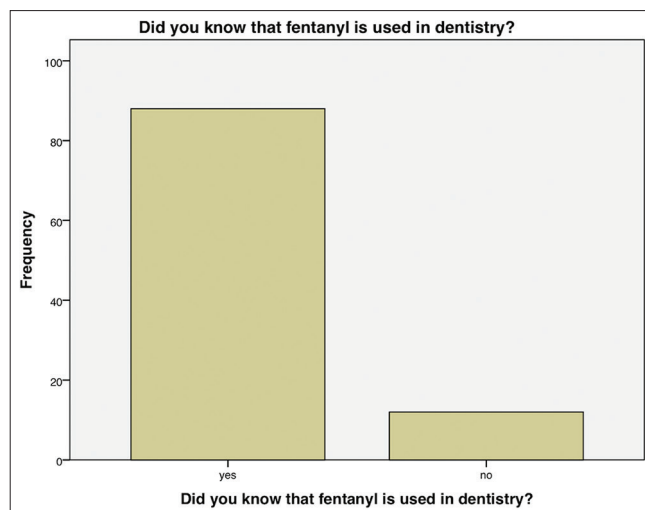
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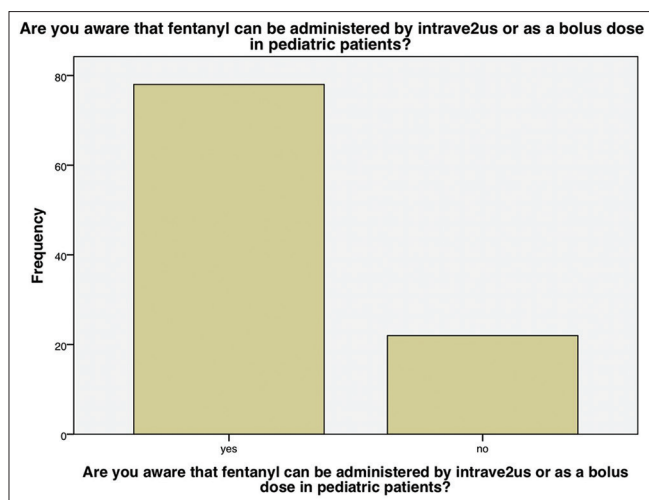
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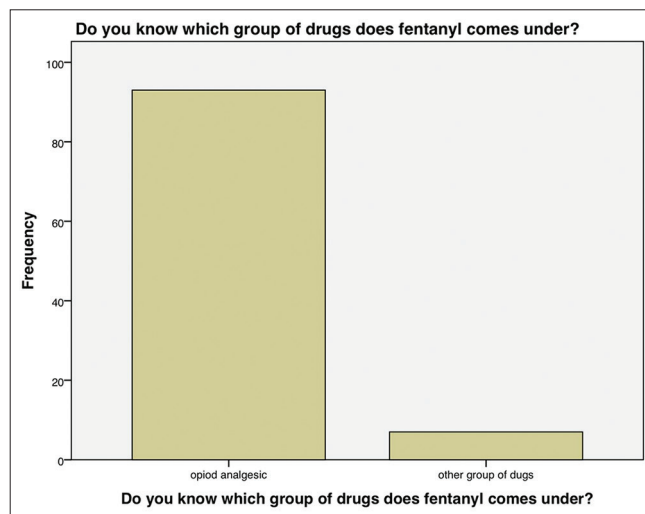
Graph 1: Bar graph representation of frequencies of males and females who took up the survey – X-axis represents gender and Y-axis represents the percentage of males and females who had participated in the survey on a scale of 1–100. About 41.61% were male and 58.39% were female



Graph 2: Bar graph showing the response given by the participants when asked if they are aware of the fact that fentanyl is used in dentistry. About 84.32% of them answered yes and the remaining answered no



Graph 3: Bar graph showing the response given by the participants when asked if they are aware of the fact that fentanyl can be administered by intravenous or as a bolus dose in pediatric patients. About 78.32% of them answered yes and the remaining answered no



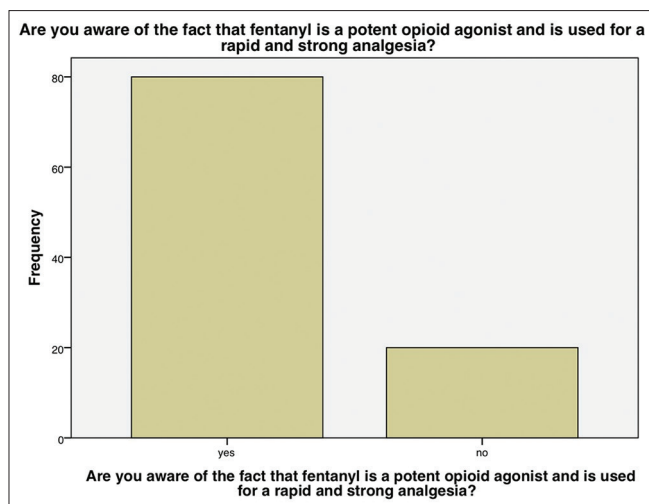
Graph 4: Bar graph showing the response given by the participants when asked which group of drugs fentanyl comes under. About 95.4% of them answered opioid analgesic and the remaining answered other groups of drugs

neuroleptanalgesia, in combination with specific neuroleptic medicines. This explains the indications, severe adverse effects, mechanism of action, and toxicity of fentanyl such that the providers can guide patients' treatment toward the best possible outcomes.^[3,4]

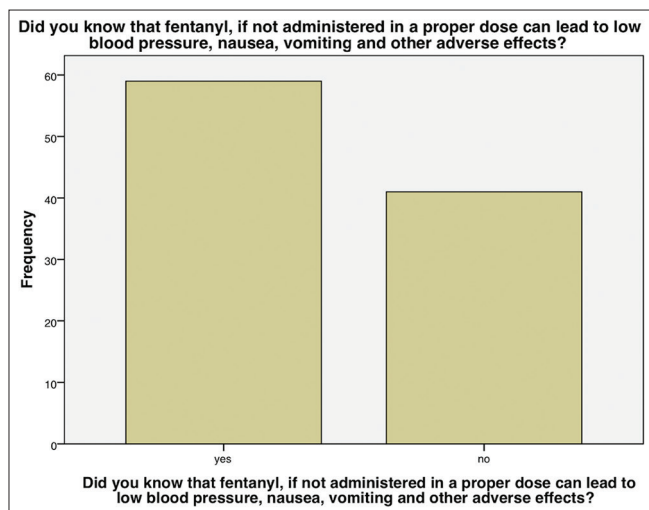
Fentanyl is similar to morphine but delivers more analgesia. The potency of this powerful agent is often 50–100 times higher.^[3] Fentanyl, on the other hand, has very distinct characteristics and pharmacokinetics. Due to its largely hepatic clearance, it is most commonly used as a sedative. Due to its adaptability in titration circumstances, it is most typically delivered as a drip

when used as a sedative.^[5] When fentanyl is used as a sedative in patients who require artificial ventilation, it may be necessary to administer high doses. Fentanyl is often used as a perioperative premedication for procedures that are likely to induce discomfort.^[6] Finally, fentanyl is sometimes used to treat epilepsy. That is, as a part of therapeutic neuroleptanalgesia, in combination with specific neuroleptic medicines.^[7]

Fentanyl is also like other opioid drugs. Fentanyl molecules act by targeting a subclass of opioid receptors in the body, many of which are in the brain inside specialized structures, and are commonly involved in emotion control, sensation



Graph 5: Bar graph showing the response given by the participants when asked if they are aware of the fact that fentanyl is a potent opioid agonist and is used for rapid and strong analgesia. About 80% of them answered yes and the remaining answered no



Graph 6: Bar graph showing the response given by the participants when asked if they are aware of the fact that fentanyl, if not administered in proper dose, can lead to low blood pressure and other adverse effects. About 59.7% of them answered yes and the remaining answered no

of pain, and, more importantly, reward.^[8] It can, however, activate additional opioid receptors, including delta and commonly the kappa receptor systems. Analgesia is produced when these receptors, particularly the Mu-receptors, are activated. In addition, dopamine, which acts as a neurotransmitter, is elevated in the centers of the brain, eliciting the conventional exhilaration and relaxing effects, and is usually linked to drug addiction.

One of the most common oral surgery operations is the extraction of impacted mandibular third molars. Regardless of the procedure's difficulties, postoperative pain is so common that it is frequently used as a tool for researching

the quality of analgesia of various medicines or physical techniques.^[9,10]

Transdermal type of drug delivery system is a commonly known concept, but it is a concept with a wide range of possibilities in postoperative pain control.^[11] The fentanyl transdermal system (FTS) is one mode of percutaneous drug delivery as a transdermal patch with an increased dosage of fentanyl, a strong, quickly effective opiate.^[12] FTS contains a drug reservoir containing fentanyl in a gel-based matrix, used as a releasing membrane that permits surface-limited and time-limited drug absorption. It produces pleasure and dysphoria, and a sustained as well as a consistent analgesic action.^[13] The prescribed dosage of the patch is 50 µg/h.

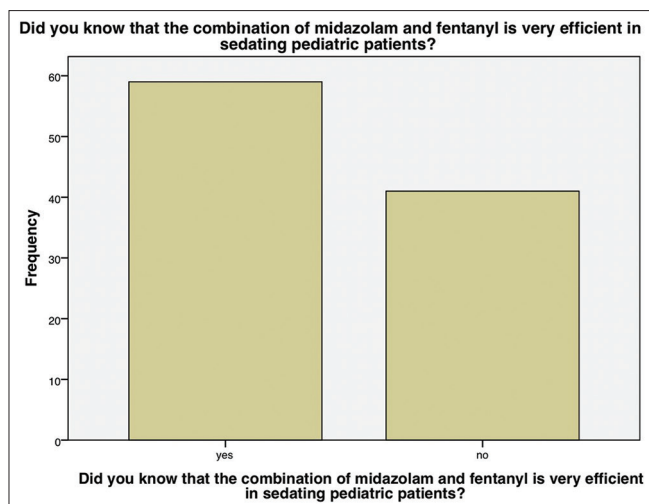
Fentanyl is also used as a pain reliever and in combination with other anesthetics. It has a quick onset and often lasts <2 h. Moderate (conscious) sedation is a typical pharmaceutical strategy of lowering anxiety and chronic pain during oral operations, such as surgery.^[14] The safety of administering moderate sedation in dentistry clinics, while developing patient response to verbal as well as tactile stimuli, is widely documented, with few problems.^[15] Fentanyl with midazolam is the most commonly preferred medication alternative for providing moderate intravenous (IV) sedation.^[16,17] This study aimed to assess knowledge and awareness about dental applications of fentanyl among dental students. Our research team has an extensive knowledge and research expertise that has translated as high-quality publications.^[18-24]

MATERIALS AND METHODS

The results of this study were based on the responses of survey participants who completed an online survey. The study's advantages include the availability of data and similar ethnicity. The study's limitations include the fact that it is a single-centered study with no assessment of geographic regions or trends. The study has been approved by Saveetha University's Ethics Board. This study was approved by the University Ethical Clearance Committee (number IHEC/SDC/PROSTHO/21/089). The following data were examined for the study: a reviewing expert used images to cross-verify all applicable responses for the study and to cross-verify the required data. To reduce sample bias, measures were implemented. The study was carried out using both internal and external validation. The statistical software used for this study is the SPSS (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY:IBM Corp), and the results were systematically analyzed and graphically represented.

RESULTS

The sample size was 150 participants. From the results obtained, we can observe that from the respondents of



Graph 7: Bar graph showing the response given by the participants when asked if they are aware of the fact that fentanyl and midazolam can be used in combination with sedate pediatric patients. About 58.5% of them answered yes and the remaining answered no

the current survey, 52% were undergraduates and 48% were postgraduate dental students. About 93% of them were aware of the fact that fentanyl comes under opioid analgesics, and 82% were aware that it is mostly used in case of pediatric patients. About 81% of the participants were aware that apart from benzodiazepines, fentanyl can also be used in combination with general anesthesia in dentistry. Only 59% of them were aware of the adverse effects of fentanyl. From the correlation between qualification of the participants and the knowledge of adverse effects of fentanyl, only 24% of the undergraduates were aware of them, whereas 35% of the postgraduates were aware. From the results, we can know that most of them were aware about the applications of fentanyl, but the area to be emphasized is the complete knowledge among the dental students regarding the drugs commonly used for anesthesia and analgesia in dentistry such as fentanyl.

DISCUSSION

A study by Bennett in 1972 stated that remifentanyl as well as fentanyl can produce less inflammatory effects of dental surgeries to the patients. The drug also revealed intraoperative hemodynamic response and postoperative analgesic effects on the patients.^[25] These results also coincide with our findings, although adults were not included in the current study.

Pandey *et al.* concluded that when administered and monitored by a qualified anesthetist, IV sedation of cooperative healthy pediatric patients with ketamine, fentanyl, and nitrous oxide-oxygen appears to be an effective and safe sedation modality as an alternative to general anesthesia.^[26] The same result is found in the present study. These results also coincide with our findings.

Similarly, Melloni revealed in his study that during unpleasant, uncomfortable, or prolonged dental operations, fentanyl reduces chronic pain, discomfort, and negative psychological sensations by providing appropriate sedation, forgetfulness, and analgesia.^[27] These results coincide with the findings in our study [Graph 1-7].

Limitations of the study are as follows: there was noninclusion of some data in the study that were not clear of certain reporting parameters. There was no limitation for external validity. The generalizability of this study results is possible. However, the drawback of the current study is the small sample size. A larger study with more subjects in different ethnic backgrounds can be assessed.

Future prospects of this study include overcoming the limitations and throwing the limelight on knowledge of fentanyl among dentists, as it is important for a dental practitioner. In the hospital setting, fentanyl is a commonly utilized narcotic. Health-care workers should have a complete knowledge of new opioid prescribing laws, which can lead to medicolegal issues including the loss of prescription privilege. Fentanyl medication can be beneficial and adverse outcomes avoided or treated if they occur with interprofessional coordination of actions and open communication.

CONCLUSION

This study revealed that most of the participants are aware of the commonly used anesthesia and analgesia such as fentanyl in dental practices. However, more continuing dental education programs and seminars must be conducted to further enhance the knowledge and understanding of dental students about drugs such as fentanyl in dental practice.

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Conflicts of interest

There are no conflicts of interest.

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